

Atty. Dkt. No. 085874-0364

#9

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Graham BANK  
Title: LOUDSPEAKER  
Appl. No.: 09/927,577  
Filing Date: 08/13/2001  
Examiner: Unassigned  
Art Unit: Unassigned

**CLAIM FOR CONVENTION PRIORITY**

Commissioner for Patents  
Washington, D.C. 20231

Sir:

The benefit of the filing date of the following prior foreign application filed in the following foreign country is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed.

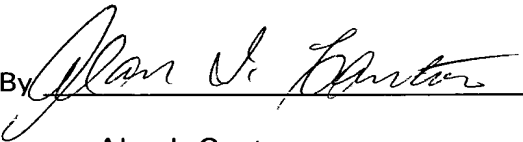
In support of this claim, filed herewith is a certified copy of said original foreign application:

- UNITED KINGDOM Patent Application No. 0019701.2 filed 08/11/2000.

Respectfully submitted,

Date **SEP 28 2001**

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By 

Alan I. Cantor  
Attorney for Applicant  
Registration No. 28,163

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P. 6455 . USP



INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed

*[Handwritten signature]*

Dated: 22 August 2001

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The  
Patent  
Office11AUG00 E560013-1 D02824  
P01/7700 0.00-0019701.2

The Patent Office

Cardiff Road  
Newport  
Gwent NP9 1RH**Request for grant of a patent***(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form).*

11 AUG 2000

NEWPORT

11 AUG 2000

## 1. Your Reference

P.6455.GBA

## 2. Patent application number

*(The Patent Office will fill in this part)***0019701.2**3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

NEW TRANSDUCERS LIMITED

IXWORTH HOUSE  
37 IXWORTH PLACE  
LONDON  
SW3 3QHPatents ADP number *(if you know it)* 728 347 6002

If the applicant is a corporate body, give the country/state of its incorporation

G.B.

## 4. Title of the invention

LOUDSPEAKER

5. Name of your agent *(if you have one)*"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*MAGUIRE BOSS  
5 Crown Street  
St. Ives  
Cambridgeshire  
PE27 5EBPatents ADP number *(if you know it)*

07188725001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country

Priority application number  
*(if you know it)*Date of filing  
*(day/month/year)*

## 7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
*(day/month/year)*8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

YES

*a) any applicant named in part 3 is not an inventor, or  
b) there is an inventor who is not named as an applicant, or  
c) any named applicant is a corporate body:)*  
*See note (d)*

**Patents Form 1/77**

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Description 5

Claims(s)

Abstract

Drawing(s) 1 +1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(*please specify*)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date 10/08/2000

*Maguire Boss*

MAGUIRE BOSS

12. Name and daytime telephone number of person to contact in the United Kingdom  
301588

SIMON GREENE

Tel: 01480

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## Loudspeaker

10       The invention relates to a loudspeaker and in particular to a loudspeaker that uses a plurality of different exciters.

      Bending wave panel loudspeakers are known, for example from WO97/09842 to New Transducers Ltd. In  
15    general, such speakers include a resonant bending wave plate and a transducer mounted on the plate to convert electrical signals into mechanical vibrations. The transducer excites the resonant bending wave modes in the plate, which then emit sound to create an acoustic output.  
20    Normally, the parameters of the panel and the exciter position are selected to provide a useful distribution of resonant bending wave modes for an effective acoustic output.

      A bending panel loudspeaker in the form of a ceiling  
25    tile is known from WO97/09843 to New Transducers Ltd. It is also known from WO97/09846, likewise to New Transducers

Ltd, to provide multiple exciters on a bending panel loudspeaker.

According to the invention there is provided a loudspeaker comprising a panel capable of supporting  
5 bending waves, and a plurality of exciters mounted on the panel for exciting bending waves in the panel to produce an acoustic output, wherein the exciters are of different types.

Depending on the required application, one or more of  
10 the following exciter types may be provided. One of the exciters may be an alarm exciter, for example a high-power narrow bandwidth exciter for producing an alarm signal in a predetermined frequency band. The exciter may produce more than 90dB sound pressure level at 1w 1m (SPL),  
15 typically 100dB  $\pm$  5dB SPL. In a narrow band at the predetermined frequency band the exciter may produce more than 100dB SPL.

One exciter may be a signal conditioning exciter to produce signal conditioning, for example to produce white  
20 noise to enhance privacy in an open plan office. The exciter may be 70dB SPL to 90dB SPL, preferably 90dB  $\pm$  5dB SPL. Another exciter may be an exciter to produce speech, and/or music. The exciter may be 80dB SPL to 100dB SPL, preferably 90dB  $\pm$  5dB SPL.

25 The alarm exciter may be connected to an alarm



circuit for providing an alarm signal to produce a large acoustic output from the panel. The signal conditioning exciter may be connected to a signal conditioning circuit to supply a signal conditioning signal to the signal conditioning exciter. The signal conditioning signal may be a white noise signal to enhance privacy in an open plan environment. The background music exciter may be connected to a signal source and an amplifier for providing background music, or speech.

10 The loudspeaker panel may be in the form of a ceiling tile.

For a better understanding of the invention a specific embodiment will now be described with reference to the accompanying drawing which shows a perspective view of an embodiment of the invention.

15 A panel 1 shaped as a conventional ceiling tile has opposed top 3 and bottom 5 faces. The bottom face is intended to face into a room when the ceiling tile is fitted. The panel is capable of supporting resonant bending waves and the panel parameters are selected for a useful distribution of bending wave resonances in frequency, for example as taught in WO97/09842 to New Transducers Ltd.

25 Three exciters are mounted on the panel. One is an alarm exciter 7 for producing an alarm signal at a

predetermined frequency. The alarm exciter 7 is coupled to the panel at a location that couples well to the resonant bending wave mode or modes at the predetermined frequency. The alarm exciter 7 is a high-power narrow  
5 band exciter for producing large excitation at around the predetermined frequency.

By high-power exciter is meant an exciter that is capable of delivering high power into the panel. This may be done by providing an exciter with a voice coil that has  
10 a high maximum current, or an exciter that delivers a high force to the panel for a given current or voltage input.

A signal conditioning exciter 9 is mounted on the panel at a preferential location or site for coupling to a broader frequency band of resonant bending wave modes.  
15 The signal conditioning exciter is for producing a signal conditioning signal, i.e. white noise to enhance privacy in an open plan office. The signal conditioning exciter may be a lower - power exciter than the alarm exciter.

A background music exciter 11 is likewise mounted to  
20 the panel. This exciter is intended for reproducing an audio signal. Since the quality of the signal output from the background music exciter 11 should be highest, this exciter is coupled at a preferential location or site for coupling to a broad frequency band of resonant bending  
25 wave modes. The location or site selected may be the best

available location; the white noise exciter may be coupled at a worse location.

The background music exciter is an intermediate power exciter capable of producing more power than the signal conditioning exciter but less than the alarm exciter.

Each of the three exciters is mounted on the top face 3 of the panel.

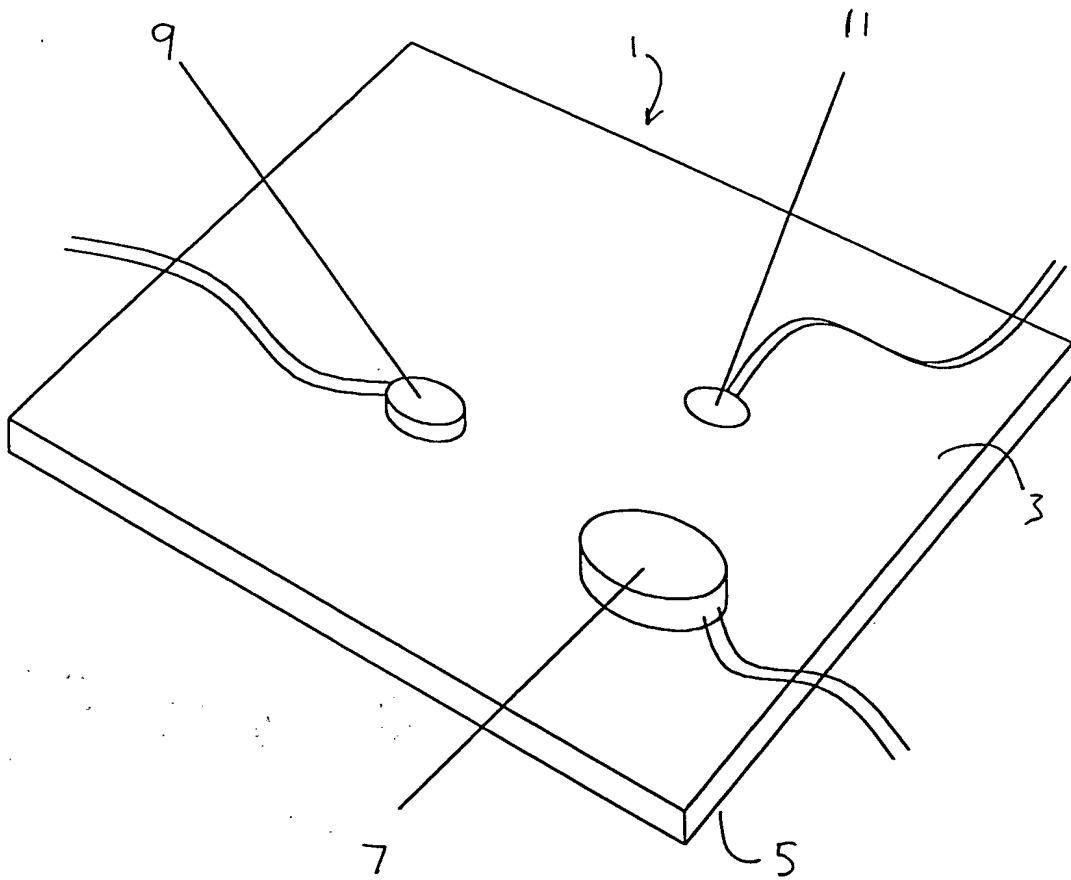
The invention is not restricted to the above embodiment. One or more of the exciters may be mounted in a recess in the panel rather than on the top face. One or more of the exciters may be not be mounted directly on the panel but coupled to it by a coupling member.

The signal conditioning exciter and the music exciter may be combined since the required bandwidth and efficiency are similar.

Speech may be provided, either through a further speech exciter optimised to produce clear speech or through the background music exciter.

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Serial No. 09/927577

Filed: 8/13/2001

Docket #: 085874-0364

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